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A Situation Report - Slotted Floors for Hogs?

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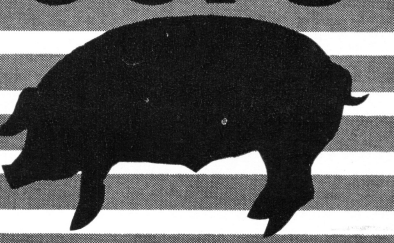
A Situation Report . . .

Slotted Floors for Hogs?



Are self-cleaning "slotted" floors the answer to the waste-disposal and cleaning problems when you raise hogs in confinement? It's too early for a final answer, but here's a summary of results and developments so far.

by Fred W. Roth and McElwyn D. Whiteker

HOG PRODUCERS using a confinement system are finding two major "janitorial" problems on their hands—cleaning the floors of the pens and disposing of the manure. Many of the methods being used for cleaning the pens aren't entirely satisfactory.

Hand methods such as scraping or washing with a stream of water take too much time and too much labor. Attempts to use tractor-mounted scrapers and buckets often have been both inconvenient and unsatisfactory. Another possibility, using gutter-cleaning equipment, is rather expensive—considering that it does only part of the cleaning job and still leaves quite a bit of hand cleaning to get the pens reasonably clean.

Self-Cleaning Floors?

With more and more hogs being raised in confinement, there's increasing interest among producers in some type of self-cleaning floor—especially for their growing and finishing buildings. While details differ, most interest is in what may be called "slotted" floors.

Do they work? Are they practical? In general, some research findings and experiences look promising. The questions of the "best" designs and materials haven't yet been settled. The answers will depend also on an individual producer's setup. More research and information is needed. But here's a summary of the research and experience information so far available.

Slotted Floors: For this report, a "slotted floor" is one that has regularly spaced openings of sufficient size and number to permit hog wastes and any other spillage to be trampled or to drain promptly *through* the floor. A pit under the floor collects and holds the waste mixture until it's emptied—either loaded into some type of liquid manure wagon and spread on a field or discharged into an outdoor farm sewage lagoon.

Slotted floors themselves aren't a new development. They've been used with livestock in Europe for a long time. Slotted floors for poultry and dairy calves have been used for a number of years in the United States. Only recently, however, has there been much experience with hogs on self-cleaning floors. Only limited research results are available so far, though several experiment stations, equipment manufacturers and a few hog producers in different states are experimenting with slotted floors of different materials and designs.

What Material?

Slotted floors can be made of various materials such as wood, concrete or steel. The "slots" can be of a variety of designs.

Drawing 1 shows two designs of hardwood grate bars that some experimenters are using. If you choose wood for the material, we advise using *hardwood* grate bars. In one test, grate bars made of softwood showed considerable wear after a year of use.

A slotted floor with grates of small concrete beams, placed about 1 inch apart, is being tested in Illinois. Drawing 2 illustrates

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this design. When the use of wooden and concrete grates was compared, no differences were observed in the effectiveness of self-cleaning or in feed efficiency of the pigs.

Slotted floors made of steel also are being tested. Two designs which appear to have some merit are illustrated in drawing 3. Expanded and flattened steel mesh with ¾-inch openings has been used in Illinois tests over a 3-year period. In 14 trials involving 728 pigs in Illinois, the pigs on steel-slot floors gained faster than pigs on solid concrete floors. In most experiments elsewhere, however, pigs on slotted floors have *not* shown a consistent advantage in rate of gain or feed efficiency.

Quarry screen made of No. 9 welded wire with 1-inch mesh also was tried in Illinois. This material was unsatisfactory because the pigs' feet and legs became sore.

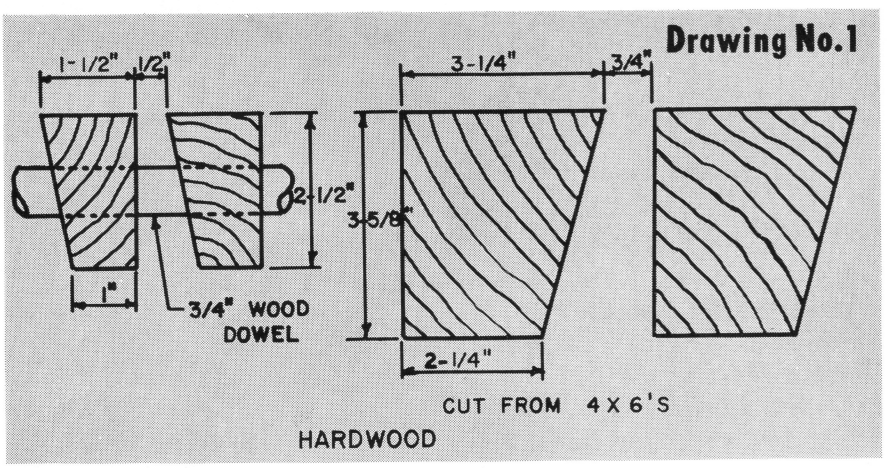
Cost: Slotted floors, with their necessary supporting systems, cost from two to four times more than a conventional concrete floor covering the same area. The housing cost per pig, however, for slotted floors may not be any more than solid concrete floors. This is because each pig is allotted less space on the slotted floor. The cost can be trimmed further by equipping only part of the area with a slotted floor—running solid concrete on the rest of the floor area. With this design, though, you still have to hand-clean the solid floor area. The material cost for hardwood slotted floors is about half that for concrete or steel.

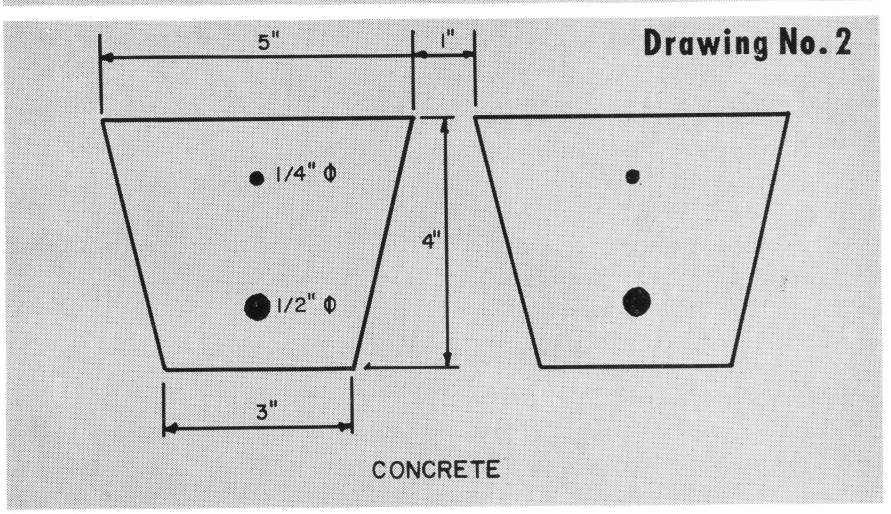
Cleaning: Various methods are being tried for removing the waste from under the slotted floors. Apparently, it's easier to remove this material than originally was thought. Some of the early slot-floor installations, for example, were equipped with flushing systems or scraping equipment such as is used in poultry houses. But recent experience indicates that the waste will flow out of the pit by gravity if the pit floor is sloped and if an outlet gate is provided.

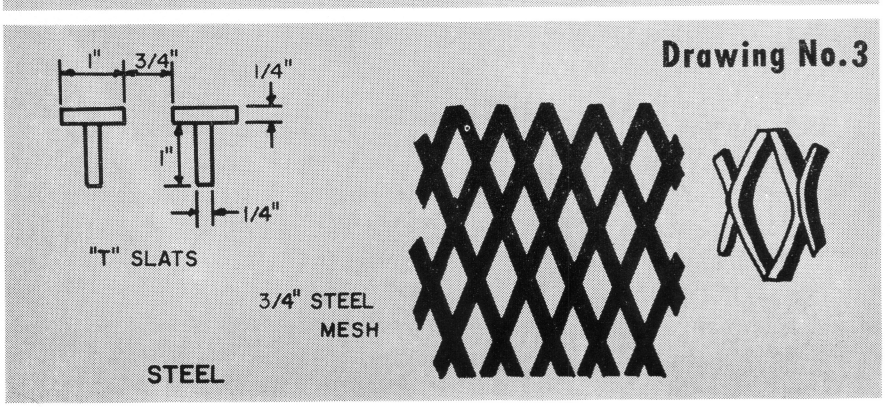
Pumping equipment can be used for emptying the collecting pit if you can't arrange a gravity discharge system. Pumping from a sump in the low point of the pit will permit the most complete emptying by this method. When most of the floor area is solid and only part is slotted, the pit can be a gutter located under the slotted portion of the floor area.

The depth of the collecting pit largely determines the frequency of cleaning. Some experimenters are building pits 3-4 feet deep to reduce the frequency of emptying. As a rule of thumb in figuring the size of pit needed, the total amount of waste from a 100-pound pig is about 1.5 gallons (0.2 cubic foot) per day; from a market hog, about 2.3 gallons (0.3 cubic foot) per day.

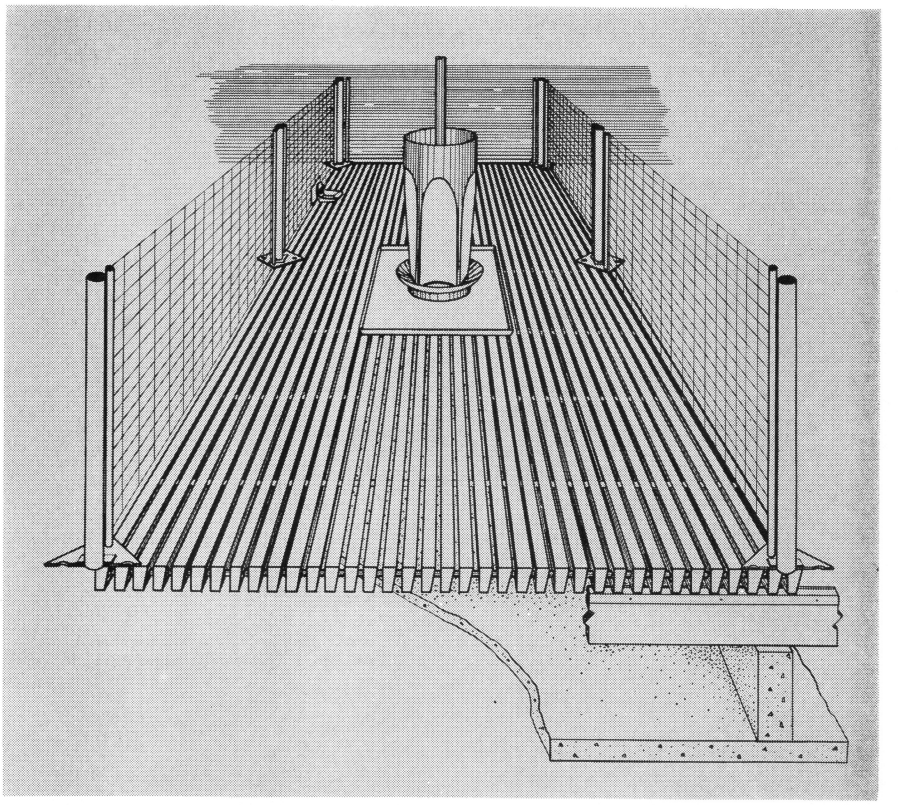
Bacterial action changes some of the solid wastes to liquid, and several gases are given off as the material decays. High concentrations of these gases may be harmful to pigs in closed buildings. A







dependable mechanical ventilation system, therefore, is necessary. An alternate method of providing air exchange also may be necessary in case the system fails because of a power interruption. Standby generating equipment may be justified in some cases. It might even be advisable to have a battery-powered system to give a warning signal if the electricity goes off.



In a Nutshell . . .

Our evaluation of the research and experience information available so far suggests that:

•*The main advantages of slotted floors as compared with solid floors are improved sanitation and a reduction in the labor necessary for cleaning.* Pigs stay clean and dry on slotted floors. Animals almost immediately are separated from their waste—creating an environment that reduces the build-up of infectious bacteria and parasites. Pens are virtually self-cleaning and require little hand labor when the entire floor is slotted.

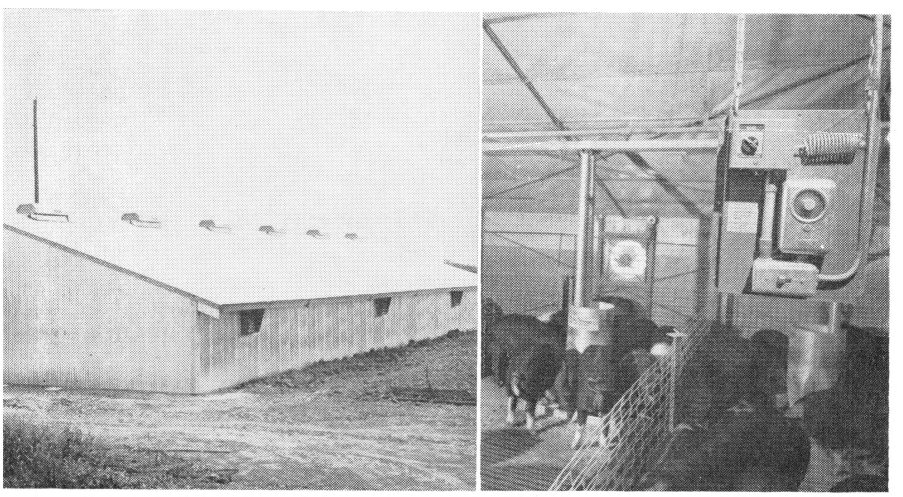
•*Slotted floors eliminate the cost of providing and handling bedding.*

•*Apparently, there's no harm to pigs' feet or legs* if the slots aren't too large—just large enough to permit the waste to work through.

•*Slotted floors reduce the amount of space needed per hog,* thus spreading the cost of the entire building over more hogs. Some producers provide as little as 6 square feet per market hog on slotted floors—compared with the 10-15 square feet commonly provided for hogs on solid concrete floors. (A reasonable amount of crowding seems necessary with slotted floors so that pigs will trample waste through the floor.)

•*During the winter, slotted floors should be used only in draft-free, insulated buildings with dependable mechanical ventilation.* In cold buildings, waste may tend to accumulate even on slotted floors. It may be necessary to control both temperature and humidity to insure self-cleaning in cold weather. During moderate weather, however, the slotted floor principle could be used out-of-doors or with portable buildings.

As the results of more research and experience become known, the most suitable materials will be better identified, and improved designs may be developed. As this additional information becomes available, you'll have a better basis for deciding whether or not slotted floors can offer savings or other advantages for your own hog-production system.



Outside view (left) of a 40- by 90-foot insulated swine-confinement feeding building. Note air inlets on the roof ridge and side-wall exhaust fans. Inside (right), slotted floors cover the entire floor area. Walls and ceilings are insulated; a thermostat and time clock control each ventilation fan. An overhead conveyor supplies feed.